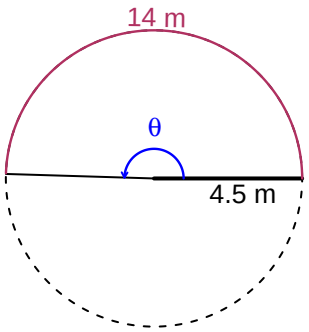
Name: Date:

Trig Final (SLTN v667)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 14 meters. The radius is 4.5 meters. What is the angle measure in radians?

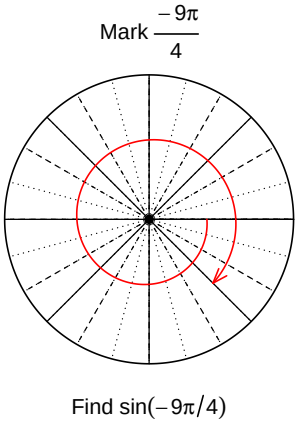


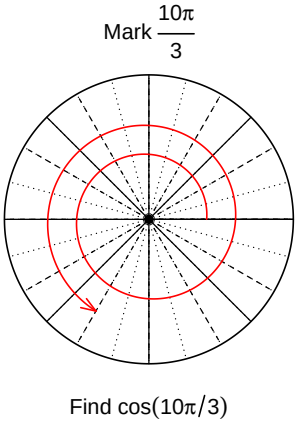
$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

$\theta = 3.111$ radians.

Question 2

Consider angles $\frac{-9\pi}{4}$ and $\frac{10\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-9\pi}{4}\right)$ and $\cos\left(\frac{10\pi}{3}\right)$ by using a unit circle (provided separately).





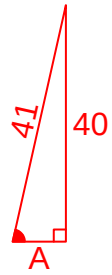
$\sin(-9\pi/4) = \frac{-\sqrt{2}}{2}$

$\cos(10\pi/3) = \frac{-1}{2}$

Question 3

If $\sin(\theta) = \frac{-40}{41}$, and θ is in quadrant III, determine an exact value for $\tan(\theta)$.

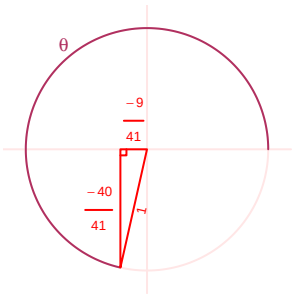
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 40^2 = 41^2$$
$$A = \sqrt{41^2 - 40^2}$$
$$A = 9$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\tan(\theta) = \frac{\frac{-40}{41}}{\frac{-9}{41}} = \frac{40}{9}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -4.96$ meters, an amplitude of 8.51 meters, and a frequency of 6.19 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -8.51\cos(2\pi 6.19t) - 4.96$$

or

$$y = -8.51\cos(12.38\pi t) - 4.96$$

or

$$y = -8.51\cos(38.89t) - 4.96$$